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## Chaetodipus pernix. By Troy L. Best and James Alden Lackey

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### *Chaetodipus pernix* (J. A. Allen, 1898)

#### Sinaloan Pocket Mouse

*Perognathus pernix* J. A. Allen, 1898:149. Type locality "Rosario, State of Sinaloa, Mexico."

*C[haetodipus]. pernix*: Hafner and Hafner, 1983:24. Elevation of subgenus to generic status.

**CONTEXT AND CONTENT.** Order Rodentia, Family Heteromyidae, Subfamily Perognathinae. The genus *Chaetodipus* contains 14 species. Two subspecies of *C. pernix* are recognized (Hall, 1981):

*C. p. pernix* (J. A. Allen, 1898:149), see above.

*C. p. rostratus* (Osgood, 1900:51). Type locality "Camoa, Rio Mayo, Sonora, Mexico."

**DIAGNOSIS.** Weakly developed rump spines distinguish *C. pernix* from *C. artus* and *C. goldmani*, which have distinct rump spines. Compared with *C. baileyi* and *C. penicillatus*, both lacking rump spines, *C. pernix* is smaller (total length < 200 mm), has darker pelage, and longer nasals (Hall, 1981; Osgood, 1900; Patton, 1967). *C. pernix* also differs from *C. penicillatus* as follows: mastoid breadth narrower; toothrow shorter; interorbital breadth narrower; mastoid bulla shorter (usually < 7.5 mm rather than more); angle between anterior border of zygoma and rostrum more obtuse (Hoffmeister and Lee, 1967).

**GENERAL CHARACTERS.** Compared with other *Chaetodipus*, *C. pernix* is small (Best, in press). The tail is long, thinly haired, and slightly crested. The pelage is dark and slightly hispid. The ears are medium in size and the soles of the feet are naked. The skull (Fig. 1) is small, narrow, and elongate. The mastoids are small and the interorbital region is constricted. The nasals are broad, flattened, and of medium length. The naso-frontal suture is not emarginate and the interparietal is wide. The molar teeth are small and weak, and the lower premolar is larger than the last molar (Osgood, 1900).

The pelage color of the dorsum is yellowish-brown; this region of yellowish-brown is profusely lined with blackish hairs, the pelage is paler on the sides, and there is a broad fulvous lateral line. Underparts are white to the base of the hairs. The upper surface of the forelimb is pale fulvous to the elbow and the outer surface of the hind limb is strongly fulvous to the tarsus. The tail is brownish above the whitish below (Allen, 1898). The ears are dusky with a minute white spot on the inferior margins (Osgood, 1900).

The length of the hind foot is 28% of the length of head and body, the length of tail is 124% of the length of head and body, and the tip of the tail is pencillate (Hatt, 1932). Mean measurements (in mm) of 20 adult males and 20 adult females, respectively, from throughout the range of the species are: total length, 162.1, 152.5; length of body, 75.2, 68.9; length of tail, 83.0, 80.1; length of hind foot, 21.6, 21.3; length of ear, 9.9, 9.1; basal length of cranium, 15.3, 14.6; greatest length of cranium, 24.4, 23.2; maxillary arch spread, 11.9, 11.4; interorbital width, 5.8, 5.6; nasal length, 9.4, 8.6; intermaxillary width, 4.4, 4.3; alveolar length, 3.6, 3.5; lacrimal length, 1.6, 1.6; maxillary arch width, 1.2, 1.2; basioccipital length, 3.8, 3.6; greatest depth of cranium, 8.0, 7.7; greatest width of cranium, 12.4, 11.9; zygomatic width, 12.4, 11.8; nasal width, 2.9, 2.7. Males are significantly larger than females in total length, length of ear, basal length of cranium, greatest length of cranium, maxillary arch spread, interorbital width, nasal length, basioccipital length, greatest depth of cranium, greatest width of cranium, zygomatic width, and nasal width (Best, in press). There is considerable variation in body size, with *C. pernix rostratus*, particularly at the northern section of its range, almost as large as sympatric *C. penicillatus* and larger than *C. pernix* (J. L. Patton, in litt.).

**DISTRIBUTION.** *Chaetodipus pernix* occurs from the coastal plain of southern Sonora to northern Nayarit, Mexico (Fig. 2; Hall, 1981). The northernmost locality of this species is Presa Alvaro Obregon, north of Ciudad Obregon, Sonora, in the coastal delta of the Rio Yaqui. The record for *C. pernix* from Tecoripa in the central Rio Yaqui basin given by Burt (1938) is based on misidentified specimens of *C. penicillatus* (J. L. Patton, in litt.). The species has been reported from Hacienda Island, west of Escuinapa, Sinaloa (Allen, 1906). It occurs at an elevation of 8 m near Mazatlan, Sinaloa (Baker, 1962), and at an elevation of 90 m near Chele,



FIG. 1. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Chaetodipus pernix* from Puerta de Canoa, Sinaloa, Mexico (female, Natural History Museum of Los Angeles County 12654). Greatest length of cranium is 24.0 mm. Photographs by T. H. Henry.

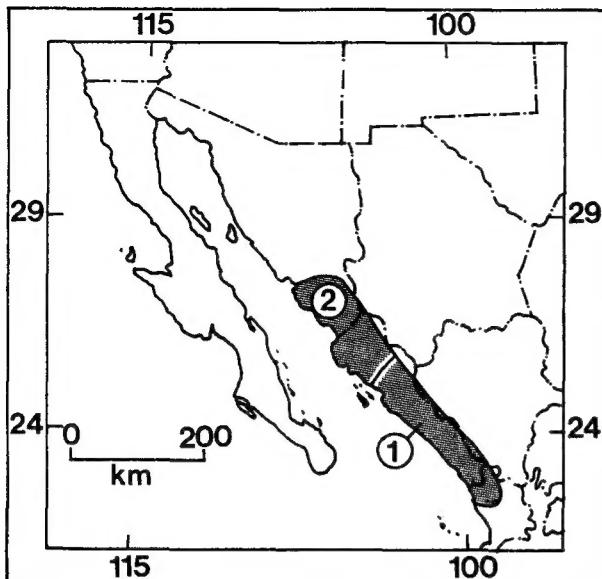


FIG. 2. Distribution of *Chaetodipus pernix* in western Mexico (Hall, 1981): 1, *C. p. pernix*; 2, *C. p. rostratus*.

Sinaloa, in the valley of the Río Pánuco (a tributary of the Río Buluarte—Hooper, 1955). No fossils of *C. pernix* are known.

**FORM AND FUNCTION.** In many species of *Chaetodipus*, specialized sebaceous caudal glands occur about 25–33% of the distance from the base to the tip of the tail and are restricted to the ventral surface. Compared with other species of *Chaetodipus*, however, the sebaceous glands associated with the hair follicles of the ventral surface of the tail in *C. pernix* are not significantly enlarged or modified (Quay, 1965).

The baculum of *C. pernix* is slender and the tip of the shaft turns sharply upward (Burt, 1936). For one specimen, bacular measurements (in mm) were: length, 11.41; width of shaft at midpoint, 0.63; height of base, 1.06; width of base, 1.25; angle of curvature of tip, 123°; length of hind foot/length of baculum, 2.01; height of base/width of base, 0.84; length of body/length of baculum, 6.57; angle of curvature of tip/length of baculum, 10.78; height of base  $\times$  100/length of baculum, 20.24 (Kelly, 1969).

**ONTOGENY AND REPRODUCTION.** At Ciudad Obregon, Sonora, young are born in October and November (Burt, 1938). In Sinaloa in early April, one female possessed one 5-mm embryo and another contained three 15-mm embryos (Hooper, 1955). The usual number of placental scars is about seven (Patton and Soule, 1967).

**ECOLOGY.** *Chaetodipus pernix* is found on the coastal plain of northern Sinaloa and southern Sonora in habitat characterized by a soil of fine alluvial silt nearly devoid of small rock material, by a flora consisting of thorny leguminous trees, arborescent cacti, and a dense understory of *Opuntia*, *rathbunia*, and small woody shrubs (Patton and Jones, 1972). In southern Sonora, *C. pernix* is common below the oak (*Quercus*) belt. This species is found in thick cactus (*Opuntia*) associations at Ciudad Obregon and is abundant along the edges of cultivated fields at Chinobampo. At Tésia (near Navajoa), *C. pernix* is common among low bushes along the first bottom of the Río Mayo (Burt, 1938). The flora here includes fig (*Ficus*) and other trees and shrubs that retain their leaves in the dry season. *C. pernix* was captured here under a dense network of vines and thorny shrubs that bordered a fallow field and a creek lined with fig trees (Hooper, 1955). Near Mazatlan, Sinaloa, this species occurs on sandy ground near spiny thickets, and was captured near a stone wall at Aduana, Sonora (Ingles, 1958). It also occurs on sandy loam soils in arid tropical habitat; a specimen was obtained next to a pile of dead palm fronds in a pasture of mixed grass and clumps of thorn shrub and coconut palms (Baker, 1962).

*Chaetodipus pernix* is granivorous (Morton, 1979). At Ciudad Obregon, their cheek pouches contained seeds of *Opuntia*, whereas the food was grass seeds along the Río Mayo near Tésia (Burt, 1938). Mammals occurring with *C. pernix* include *Notiosorex craw-*



FIG. 3. Karyotype of *Chaetodipus pernix pernix* from near Pericos, Sinaloa (upper;  $2n = 38$ ) and from near Playa de Novilleros, Nayarit (middle;  $2n = 36$ ), and of *C. pernix rostratus* from near Vicam, Sonora (lower;  $2n = 52$ ). Figure provided by J. L. Patton.

*fordi*, *Sigmodon hispidus* (Baker, 1962), *Peromyscus eremicus*, *Liomys pictus*, *C. artus* (Wrenn and Loomis, 1967), *C. baileyi* (Patton and Jones, 1972; Patton et al., 1981), *C. goldmani* (Patton and Jones, 1972; Patton et al., 1981), and *C. penicillatus* (Patton and Soule, 1967; Patton et al., 1981).

Ectoparasites of *C. pernix* include the chiggers *Euschoengastoides annectens*, *E. arizonae*, *E. expansellus*, *E. tumidus* (Loomis, 1971), *Hexidionis navojoae* (Lucas and Loomis, 1968), *Hyponeocula rugosa* (Tanigoshi and Loomis, 1974), *Otorhinophila intrasola* (Loomis and Wrenn, 1973; Wrenn and Loomis, 1967), *O. sinaloae* (Wrenn and Loomis, 1967), *Trombicula panamensis*, and *T. potosina* (Ryckman and Roos, 1955). No other parasites are known from the Sinaloan pocket mouse (Whitaker, in press).

**GENETICS.** The karyotypes of *C. pernix pernix* and *C. pernix rostratus* are shown in Fig. 3. The diploid number of chromosomes in *C. pernix pernix* is 36–38, the fundamental number (FN) is 56, and the karyotype consists of 10–12 pair of biarmed chromosomes, 6–8 pair of uniaimed chromosomes, a biarmed X chromosome, and a uniaimed Y chromosome. The diploid number of chromosomes in *C. pernix rostratus* is 52, the FN is 56, and the karyotype consists of 2 pair of biarmed chromosomes, 24 pair of uniaimed chromosomes, a biarmed X chromosome, and a uniaimed Y chromosome (Patton, 1970).

Hybrids between *C. pernix rostratus* and *C. penicillatus pricei* have been found near Vicam, Sonora. The hybrids possessed a diploid number of 49 chromosomes, intermediate between the  $2n = 52$  and  $2n = 46$  karyotypes of the respective parental species. Examination of the reproductive tracts indicated that the number of placental scars was significantly less (three) than that found in both parental species (about seven), suggesting the hybrids were partially or completely sterile (Patton and Soule, 1967).

In an examination of 26 loci in 40 specimens from six populations (including both subspecies) of *C. pernix*, the mean number

of alleles per locus was 1.404, the mean proportion of loci polymorphic per population was 0.250, and the mean proportion of loci heterozygous per individual was 0.084 (range, 0.067–0.103). There appears to be less biochemical than karyotypic variation between subspecies. Within *C. pernix rostratus*, populations differ by <3% on the average (Patton et al., 1981).

**REMARKS.** Bacula of *C. pernix* have a greater resemblance to those of *C. goldmani* than to those of *C. penicillatus*. Because of this characteristic and because *C. pernix* has a FN within the range exhibited by members of the *intermedius*-group (FN = 54–58), a closer relationship to this group is more likely than to the *penicillatus*-group (FN = 48—Patton, 1967). However, hybrids of *C. penicillatus* and *C. pernix* are known (Patton and Soule, 1967).

Phenetic analyses of morphologic characters places *C. pernix* close to *C. artus* (Best, in press; Caire, 1976) and *C. arenarius* (Best, in press). Relationships based upon biochemical data indicate that *C. pernix* is closest to *C. artus*, *C. baileyi*, *C. formosus*, *C. goldmani*, *C. intermedius*, *C. nelsoni*, and *C. penicillatus*. Because of karyotypic differences, the two subspecies of *C. pernix* may represent cryptic species; however, the overall level of genic similarity implies a close phyletic relationship (Patton et al., 1981).

*Chaetodipus* is derived from the Greek *chaeta*, referring to bristle-like hairs, *di* meaning two, and *podos* alluding to feet (Jaeger, 1955). The specific epithet *pernix* may be derived from the Latin *pernix*, meaning nimble, agile, swift (Brown, 1954), or from the Greek *perknos*, referring to dark coloration (Jaeger, 1955).

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T. L. BEST, DEPARTMENT OF ZOOLOGY AND WILDLIFE SCIENCE AND ALABAMA AGRICULTURAL EXPERIMENT STATION, 331 FUNCHESS HALL, AUBURN UNIVERSITY, ALABAMA 36849-5414; J. A. LACKEY, DEPARTMENT OF BIOLOGY, STATE UNIVERSITY OF NEW YORK, OSWEGO, NEW YORK 13126.